

Remarks

Applicant has received and carefully reviewed the Office Action mailed November 21, 2007. Claims 1-54 are pending, with claims 31-35 withdrawn. Reconsideration and allowance of the pending claims are respectfully requested.

Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 15, 18, and 21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Rejection under 35 U.S.C. § 112, second paragraph

Claims 13 and 50-52 are rejected as being indefinite. The Examiner asserts that, "the two ends of an electrode (which would be within one layer) are said to have two different thicknesses of film. Claim 1 from which claim 13 depends recites, "a plurality of openings situated in the first conductive layer, the insulating layer and the second conductive layer forming channels having first and second discharge device electrodes." There are two electrodes and hence two different thicknesses are possible. Reconsideration and withdrawal of the rejection is respectfully requested.

The Examiner asserts that the "means" recited in claim 50 could all be the same element or could be referring to different elements, thus it does not distinctly claim the subject matter of the invention. One of ordinary skill in the art would understand that the means for providing an electrical discharge would not be the same member as the means for enclosing the means for providing an electrical discharge. Additionally one of ordinary skill in the art would understand that the means for ion pumping would not be the same "means" as is used for providing an electrical discharge and the means for enclosing the means for providing an electrical discharge. Applicant submits that the claims comply with the requirements of 35 U.S.C. § 112, second paragraph. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection under 35 U.S.C. § 102(b)

Claims 22-30, 36-41, 50, and 53-54 are rejected as being anticipated by Reader (US 3,554,669). Independent claim 22, as amended, recites:

An ion pump comprising:
a flow channel;
a first conductive material at a first upstream position in the channel; and
a second conductive material proximate at a second downstream position in the flow channel; and
wherein:
the first and second conductive materials form a discharge device;
the first conductive material has an upstream tapered contour;
a distance between the first position and the second position is maintained by a non-conducting spacer material; and
a flow direction of the flow channel is approximately parallel to the elongated dimension through the non-conducting spacer material, and proceeding from the upstream tapered first conductive material to a downstream blunt conductive material, wherein the conductive materials are electrodes forming the discharge device.

Emphasis added. Reader does not appear to teach such a structure. Independent claim 22 recites the first conductive material has an upstream tapered contour. Reader appears to teach a device in which flow is from an upstream rounded opening 16 towards the downstream sharp tip 18a opening. See FIGS. 1 and 2. Reader describes this at column 2, lines 36-38 as follows, "Projections 18 formed between the channels 16 are tapered to form sharp tips 18a at their downstream end." Emphasis added. The device of Reader thus appears to have the opposite configuration as that claimed.

Independent claim 25 recites, in part, " the first conductive material has an upstream angular projection into the channel " and "a flow direction of the channel is approximately parallel to the elongated dimension through the non-conducting spacer material and proceeds from the upstream angular projection into the channel." Emphasis added. As discussed above, Reader appears to teach a device having sharp tips 18a at the downstream location of the openings, and thus appears to have a configuration reversed to that claimed. Also as discussed above, the upstream location appears to have rounded tips. This is the opposite configuration from what is currently claimed.

Independent claim 36 recites, in part, "wherein the first orifice has an upstream sharp-like contour to achieve local high intensity electric fields." As discussed above, Reader appears to teach a sharp tip 18a at the second, downstream opening, as shown in FIGS. 1 and 2.

In response to Applicant's arguments with respect to independent claims 22, 25, and 36, the Examiner states, "Examiner maintains that projection or contour 18 in Reader does indeed have a sharp-like or prominent upstream projection. Just because the front side of 18 does not come to a point does not mean it is not 'sharp-like' or prominent." Independent claims 22 and 25 now include the terms tapered and angular in place of prominent. Certainly one of ordinary skill in the art would not equate the rounded tip of Reader with the angular or tapered tip of the present invention. Further, one of ordinary skill in the art would not equate the rounded tip of Reader to a "sharp-like" tip as is currently claimed in independent claim 36.

The Examiner goes on to assert that the flow in Reader most definitely goes from an upstream prominent conductive material (front of 18) to a downstream non-prominent conductive material (front of 22). Independent claim 22, as amended, recites the upstream tapered contour is on the upstream end of a discharge device that has a downstream blunt contour, thus a single device has an upstream taper and downstream blunt end. Reader appears to disclose the opposite configuration as shown in FIG. 1. Further, the Examiner appears to acknowledge Reader's opposite configuration in recognizing the "upstream" prominent conductive material is on element 18 and the "downstream" non-prominent conductive material is on element 22. Independent claims 25 and 36 recite similar language specifying that it is the upstream portion of a device that has the angular or sharp-like contour. In view of the clarifying amendment to claims 22, 25, and 36, Applicants submit that Reader cannot be interpreted as teaching the identical structural elements as claimed.

Independent claim 53, as amended, recites, in part, "a plurality of openings situated in the first conductive layer, the insulating layer and the second conductive layer forming channels having first upstream and second downstream discharge device electrodes, respectively, wherein the openings in the first conductive layer at the first discharge device electrodes are upstream and are formed by a sharp point in the conductive layer." Emphasis added. As discussed above, Reader appears to teach sharp tips 18a at the exit, or downstream end of the first conductive layer. See FIGS. 1 and 2.

In response to Applicant's arguments with respect to independent claim 53, the Examiner asserts, "Reader does indeed disclose that the opening in the first conductive layer 12 are formed by a sharp point in the conductive layer. The sharp points of 12 are still in the first conductive layer and they form openings upstream of 22." Claim 53 states that the openings are in the first upstream discharge device are upstream and formed by a sharp point. One of ordinary skill in the art would see that this is opposite of what is taught by Reader wherein the downstream end of the first conductive members has sharp tips. Further, as discussed above, the Examiner appears to acknowledge that the "upstream" and "downstream" portions asserted to read on the claims are in fact on different and separate structures in Reader. The Examiner appears to acknowledge that Reader is being interpreted as having one structure with a pointed tip at the downstream end and another structure having a rounded tip at the upstream end. Applicants submit that the amendment to claim 53 clarifies the structure of the discharge device electrodes as having upstream sharp points, which is the opposite structure taught by Reader.

For at least the reasons set forth above, Reader does not appear to teach each and every element of the independent claims or the claims dependent thereon. Additionally, there is no motivation or suggestion for one of ordinary skill in the art to modify Reader to achieve the claimed device. Reconsideration and withdrawal of the rejection are respectfully requested.

Rejection under 35 U.S.C. § 103(a)

Under the heading of "Claim Rejections – 35 USC § 103" the Examiner states that claims 1-5, 9-12, 14, 16, 17, and 20 are rejected under 35 U.S.C. §102(b) as being anticipated by Reader (US 3,554,669). As these claims were not included in the above 102 rejection over Reader, it is assumed that the Examiner meant to reject the claims under §103(a) as being unpatentable over Reader. Clarification is requested. Applicant respectfully traverses the rejection.

Independent claim 1, as amended, recites:

An ion pump comprising:
an insulating layer;
a first conductive layer situated on the upstream side of the insulating layer;
a second conductive layer situated on the downstream side of the insulating layer;

a plurality of openings situated in the first conductive layer, the insulating layer and the second conductive layer forming channels having a first upstream and a second downstream discharge device electrodes, wherein the first electrode has a sharp-like shape at an upstream end and a blunt downstream end, wherein the plurality of openings are grouped into upstream inputs formed by the first electrode and downstream outputs formed by the second electrode, and the openings situated at inputs are formed by upstream sharp-like conductor ends and the openings situated at outputs are formed by downstream non-sharp-like conductor ends; and

an enclosure containing the channels and having an input port proximate to an input side of the plurality of openings and an output port proximate to an output side of the plurality of openings.

Reader does not appear to teach the openings situated at inputs are formed by upstream sharp-like conductor ends and the openings situated at outputs are formed by downstream non-sharp-like conductor ends. The Examiner asserts that, “there is no reason given as to why the downstream ends of the first and second electrodes has to be non-sharp-like.” Support for the shape may be found, for example, at page 16, lines 9-16 of the present application which recite:

The openings 46 on the first conductive layer 32 may have a sharp-like configuration, and the openings 47 on the second conductive layer 31 may have a non-sharp-like configuration. This arrangement provides for predominant generation of in-situ ions proximate to the sharp-edged conductor openings 46. The ions then bear predominantly the polarity of those sharp edges, which then may induce a fluid 55 flow of neutral molecules as a result of the force and viscous drag of those predominant ions.

It is submitted that the shape is not merely a design choice, but serves a specific function. Further, Reader teaches at column 2, lines 59-62 that, “At the downstream end of the emitter 12, the sharp tips 18a serve to easily allow excess electrons to flow therefrom and attach themselves to molecules of the fluid within the device to form ions.” This appears to be the opposite configuration and teaches away from the present invention. Further, there is no motivation for one of ordinary skill in the art to modify the device of Reader to achieve the claimed device. Reconsideration and withdrawal of the rejection are respectfully requested. Because they depend from claim 1, all elements of dependent claims 2-5, 9-12, 14, 16, 17, and 20 are not present in the cited prior art, and thus the cited prior art cannot render these claims obvious.

Claims 6-8 and 51-52 are rejected as being unpatentable over Reader in view of Tennent (US 6,031,711). For at least the reasons set forth above, Reader does not appear to teach each and every element of independent claims 1 and 50, from which claims 6-8 and 51-52 depend. Tennent does not appear to teach what Reader lacks. Additionally, there is no motivation for one of ordinary skill in the art to modify the devices of Reader and/or Tennent to achieve the claimed device. Reconsideration and withdrawal of the rejection are respectfully requested.

Claim 13 is rejected as being unpatentable over Reader. For at least the reasons set forth above, Reader does not appear to teach each and every element of independent claim 1, from which claim 13 depends. Additionally, there is no motivation for one of ordinary skill in the art to modify the device of Reader to achieve the claimed device. Reconsideration and withdrawal of the rejection are respectfully requested.

Claim 19 is rejected as being unpatentable over Reader in view of Fischer (US 6,583,407). For at least the reasons set forth above, Reader does not appear to teach each and every element of independent claim 1, from which claim 19 depends. Fischer does not appear to teach what Reader lacks. Additionally, there is no motivation for one of ordinary skill in the art to modify the devices of Reader and/or Fischer to achieve the claimed device. Reconsideration and withdrawal of the rejection are respectfully requested.

Claims 42-46 and 49 are rejected as being unpatentable over Reader in view of Henoch (US 6,106,236). Applicant respectfully traverses the rejection.

Independent claim 42 recites:

A method for pumping, comprising:

providing at least one set of first upstream and second downstream electrodes separated by a distance;

containing the at least one set of first and second electrodes in an enclosure having an input and an output;

shaping the first electrode to have an upstream sharp-like opening at a first end so as to be suitable for providing a corona of ionization of a fluid; and

applying a DC voltage to the at least one set of first and second electrodes to result in a corona at the first electrode; and
wherein the corona may generate ions to induce a fluid flow in the enclosure.

As discussed above, Reader does not appear to teach shaping the first electrode to have an upstream sharp-like opening at a first end. Reader appears to teach away from this method

step. Henoch does not appear to provide what Reader lacks. Thus, even if one were to combine the teachings of Reader and Henoch, one would not arrive at the claimed method. Additionally, there is no motivation for one of ordinary skill in the art to modify the devices of Reader and/or Henoch to achieve the claimed device. Reconsideration and withdrawal of the rejection are respectfully requested. Because they depend from claim 42, all elements of dependent claims 243-46 and 49 are not present in the cited prior art, and thus the cited prior art cannot render these claims obvious.

Claims 47-48 are rejected as being unpatentable over Reader in view of Henoch and further in view of Fischer. For at least the reasons set forth above, neither Reader nor Henoch teaches or suggests the basic elements of claim 42, from which claims 47-48 depend. Fischer does not appear to provide what Reader and Henoch lack, as discussed above. Reconsideration and withdrawal of the rejection are respectfully requested.

Reconsideration and reexamination are respectfully requested. It is submitted that, in light of the above remarks, all pending claims should now be in condition for allowance. If a telephone interview would be of assistance, please contact the undersigned attorney.

Respectfully submitted,

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